CLAIMS

What is claimed is:

1. An apparatus for image processing in a handheld device, the apparatus comprising:

a first memory device that receives a video input signal containing an encoded video frame comprising a plurality of portions of encoded video frame data, the first memory device having a storage capacity less than all of the plurality of portions of encoded video frame data for the encoded video frame, the first memory device receiving a first portion of the encoded video frame data;

a graphics processor coupled to the first memory device such that the graphics processor receives the first portion of the encoded video frame data and generates a first graphics portion; and

a second memory device receiving the first graphics portion.

2. The apparatus of claim 1 further comprising:

an external memory device coupled to the second memory device such that the first graphics portion may be stored therein.

3. The apparatus of claim 2 wherein the first memory device receives all of the portions of the encoded video frame data and provides each of the portions of the encoded video frame data to the graphics processor on a portion-by-portion basis.

4. The apparatus of claim 3 wherein the graphics processor generates a plurality of graphics portions and provides the plurality of graphics portions to the second memory device on a portion-by-portion basis.

5. The apparatus of claim 4 wherein the second memory device provides the plurality of graphics portions to the external memory on a portion-by-portion basis.

6. The apparatus of claim 5 further comprising:

at least one display operably coupled to the external memory such that an output display may be provided from the external memory, wherein the output display includes the plurality of graphics portions.

7. The apparatus of claim 6 wherein the graphics processor further includes a quantization table for generating the graphics portions having an adjusted data set and wherein the output display is a thumbnail of the plurality of graphics portions.

8. The apparatus of claim 1 further comprising:

a real time direct memory access device coupled to the first memory device and the second memory device and the graphics processor such that the real time direct memory access device provides for direct access to the first memory device and the second memory device.

9. The apparatus of claim 8 wherein the first memory device is a first portion of an embedded memory device and the second memory device is a second portion of the embedded memory device.

10. A method for image processing in a handheld device, the method comprising:

receiving a video input frame including a plurality of portions of encoded video frame data;

writing a first portion of encoded video frame data to a first memory device having a storage capacity less than the video input frame;

reading the first portion of encoded video frame data from the first memory device;

providing the first portion of encoded video frame data to a graphics processor;

graphically processing the first portion of encoded video frame data to generate a first graphics portion; and

writing the first graphics portion to a second memory device.

11. The method of claim 10 further comprising:

writing the plurality of portions of encoded video frame data to the first memory device on a portion-by-portion basis;

reading the plurality of portions of encoded video frame data from the first memory device on a portion-by-portion basis;

providing the plurality of portions of encoded video frame data to the graphics processor on a portion-by-portion basis;

graphically processing the plurality of portions of encoded video frame data to generate a plurality of graphics portions on a portion by portion basis; and

writing the plurality of graphics portions to the second memory device, on a portion-by-portion basis.

12. The method of claim 11 further comprising:

writing the first graphics portion and the plurality of graphics portions to an external memory device, on a portion-by-portion basis.

13. The method of claim 12 further comprising:

providing the first graphics portions and the plurality of graphics portions to an LCD display on the handheld device.

14. The method of claim 11 wherein the step of graphically processing the plurality of portions of encoded video frame data includes at least one of following: format conversion, scaling, rotation, discrete cosine transformation, adjusting each one of the plurality of portions of encoded video frame data using a quantization table, format and run length encoding.

15. The method of claim 10 wherein the first memory portion and the second memory portion are dual buffers having an approximate storage capacity for storing two of the plurality of portions of encoded video frame data.

16. The method claim 10 wherein the first memory portion and the second memory portion are disposed within an embedded memory.

17. The method of claim 10 further comprising:

receiving the video input frame from a camera disposed within the handheld device.

18. The method of claim 10 wherein the steps of reading and writing are performed by a real time direct memory access device using a ring buffer approach.

19. A handheld device comprising:

a camera capable of acquiring a video frame comprising a plurality of portions of encoded video frame data and generating a video input signal containing the plurality of portions of encoded video frame data;

a first memory device having a storage capacity less than all of the plurality of portions of encoded video frame data for the encoded video frame, the first memory device receiving a first portion of the encoded video frame data;

a real time direct memory access device coupled to the first memory device such that the real time direct memory access device writes the first portion of encoded video frame data to the first memory device;

a graphics processor operably coupled to the first memory device such that the graphics processor receives the first portion of the encoded video frame data through the real time direct memory access device and generates a first graphics portion; and

a second memory device coupled to the real time direct memory access device wherein the second memory device receives the first graphics portion from the first graphics processor through the real time direct memory access device.

20. The handheld device of claim 19 wherein the graphics processor includes a quantization table capable of generating the first graphics portion in relation to a storage capacity of the second memory device.

21. The handheld device of claim 19 wherein the first memory device receives all of the portions of the encoded video frame data and provides each of the portions of the encoded

video frame data to the graphics processor on a portion by portion basis, the graphics processor generates a plurality of graphics portions and provides the plurality of graphics portions to the second memory device on a portion by portion basis and the second memory device provides the plurality of graphics portions to an external memory on a portion by portion basis.

22. The handheld device of claim 21 further comprising:

at least one display operably coupled to the external memory such that an output display may be provided from the external memory, wherein the output display includes the plurality of graphics portions.

23. The handheld device of claim 21 wherein the graphics processor further includes an image decoder and a motion picture decoder.

24. The handheld device of claim 21 wherein when the camera acquires an image, the image decoder is capable of performing at least one of the following: a format conversion, scaling and rotating.

25. The handheld device of claim 24 wherein the image is a JPEG encoded image.

26. The handheld device of claim 24 wherein upon a scaling operation, the plurality of graphics portions represent a partial video frame.

27. The handheld device of claim 21 wherein when the camera acquires a motion picture, motion picture decoder is capable of performing at least one of the following: a discrete cosine transform, quantization, and vector run length encoding.

28. The handheld device of claim 27 wherein the motion picture decoder compares the portion of the encoded video display with a portion of a reference frame stored in a reference buffer to generate a potential frame.

29. The handheld device of claim 27 wherein the motion decoder is an MPEG decoder.

30. The handheld device of claim 19 wherein the real time direct memory access device uses a ring buffer approach.

31. A method for image processing in a handheld device, the method comprising:

receiving a video input frame from a camera, the video input frame including a plurality of portions of encoded video frame data;

writing the plurality of portions of encoded video frame data to a first memory device having a storage capacity less than the video input frame, on a portion-by-portion basis;

reading the plurality of portions of encoded video frame data from the first memory device on a portion-by-portion basis;

providing the plurality of portions of encoded video frame data to a graphics processor on a portion-by-portion basis;

graphically processing the plurality of portions of encoded video frame data to generate a plurality of graphics portions, on a portion by portion basis; and

writing the plurality of graphics portions to a second memory device on a portion-by-portion basis.

32. The method of claim 31 further comprising:

writing the plurality of graphics portions to an external memory device, on a portion-by-portion basis.

33. The method of claim 32 further comprising:

providing the plurality of graphics portions to an LCD display on the handheld device.

34. The method of claim 32 further comprising:

when the input video frame is an image, the graphics processor being capable of performing at least one of the following: a format conversion, scaling and rotation.

35. The method of claim 32 further comprising:

when receiving the input video frame is a single frame of a motion picture, the graphics processor being capable of performing at least one of the following: a discrete cosine transform, a quantization and vector run length encoding.

36. The method of claim 35 wherein a quantization table may be utilized to adjust the plurality of graphic portions to accommodate a storage capacity of the second memory portion.

37. The method of claim 32 wherein the first memory portion and the second memory portion are disposed within an embedded memory.

38. The method of claim 37 wherein the steps of reading and writing are performed by a real time direct memory access device using a ring buffer approach.